

## F1

## Compounds all around

## Learn about:

- The range of compounds
- The properties of compounds

## Elements and compounds

In Unit E Atoms and elements you learnt that an element is a substance that contains only one type of atom and a compound is a substance with more than one type of atom joined together.

## Is it water?

Water is a compound. The diagram below shows two molecules. The molecule on the left is a water molecule. The molecule contains two hydrogen atoms and one oxygen atom. The white balls stand for hydrogen and the red ball stands for oxygen.



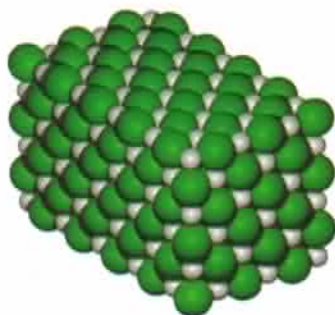
The molecule on the right in the diagram is a **hydrogen peroxide** molecule. Hydrogen peroxide is also a compound. It also contains hydrogen and oxygen atoms joined together.

- How many different atoms are there in water?
- Why isn't water an element?
- What is the difference between the water molecule and the hydrogen peroxide molecule?

## Glucose

Glucose is also a compound. Look at the diagram on the right. It shows a model of one glucose molecule. The formula for glucose is  $C_6H_{12}O_6$ .

As you can see, the glucose molecule is larger than water. It contains 24 atoms joined together.



## Sodium chloride

Not all compounds are made of molecules. In some compounds the different atoms are arranged to make crystals rather than molecules. The scientific name for salt is sodium chloride. Each sodium chloride crystal contains millions of atoms. The diagram on the left shows sodium atoms (grey) and chlorine atoms (green) arranged to make a crystal.

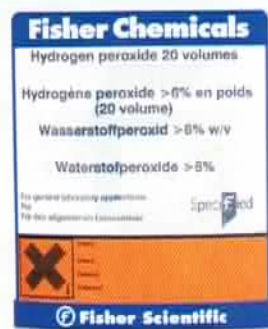
The formula for sodium chloride is  $NaCl$ . This shows there is one sodium atom for each chlorine atom in sodium chloride.

## Do you remember?

A molecule is a group of atoms joined together. They can be the same atom, as we saw in an oxygen molecule, or they can be a group of different atoms, like in carbon dioxide.

## Did you know?

One extra oxygen atom makes a big difference. Hydrogen peroxide is a dangerous, corrosive liquid. Diluted with water it is used as a disinfectant.



- How many different types of atoms are there in:
- carbon dioxide?
  - glucose?
  - sodium chloride?

## Hazard to harmless

The compound sodium chloride is very different from the two elements called sodium and chlorine.

Sodium is a shiny, silver metal. It has to be stored under oil because it would lose its shine and turn into a white powder if you left it out in the air.

Chlorine is a poisonous green gas.

Sodium chloride is a solid with colourless crystals.



## Compare the properties

This table compares sodium, chlorine and sodium chloride.

The melting point is the temperature at which a solid melts or a liquid freezes. The boiling point is the temperature at which a liquid boils or a gas condenses. Each **pure** substance has a known melting point and boiling point.

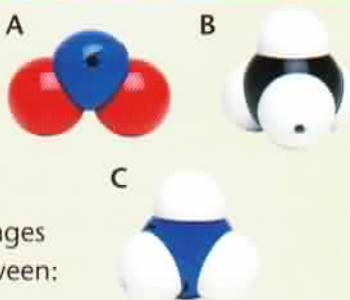
You can see that sodium chloride has a much higher melting point than either sodium or chlorine.

Substance	Sodium	Chlorine	Sodium chloride
Element/compound	element	element	compound
Symbol/formula	Na	Cl	NaCl
Type	metal	non-metal	salt
Appearance	shiny, silver solid	green gas	colourless crystals
Melting point in °C	98	-101	801
Boiling point in °C	883	-35	1413
Does it react with hydrochloric acid?	Yes, it makes hydrogen.	no	no

- Compare the boiling points of sodium, chlorine and sodium chloride.

## Questions

- 1 Look at these diagrams. They show models of three different compounds. Give the formula for each. (Black is carbon, red is oxygen, white is hydrogen, blue is nitrogen.)



- 2 a Use the information on these two pages to make a list of the differences between:
- sodium and sodium chloride
  - chlorine and sodium chloride.
- b Write a word equation for the formation of sodium chloride from sodium and chlorine.
- c How do you know that a new substance is made when sodium and chlorine react?

## For your notes:

- Some compounds contain molecules.
- Other compounds have different types of atoms fixed together to make crystals.
- Compounds are very different from the elements that made them.
- All **pure** substances have a known melting point and a known boiling point.